

DETERMINING KEY FACTORS FOR KNOWLEDGE ECONOMY DEVELOPMENT IN BOSNIA AND HERCEGOVINA

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Abstract:

The concept of „knowledge economy“ is based on the view that knowledge and information are at the center of economic growth and development. In today's ever changing world knowledge has become a key factor for sustainable economic development and competitive advantage. This article looks at key factors for development of knowledge economy and addresses the challenges and imperatives in Bosnia and Herzegovina in the era of knowledge economy. Bosnia and Herzegovina being a transition country with poor economic performance an economic policy reform is much needed and overdue. A shift toward a knowledge economy might represent a road to better sustainable economic growth, prosperity and better quality of life. The aim of this paper is to determine key knowledge economy factors which have an impact on knowledge economy development in Bosnia and Herzegovina and economic growth of its national economy. Benchmarking process and factor analysis were used to determine the key factors among the four knowledge economy pillars (economic incentives and regime, education and training, ICT and research and development). Proposals and measures for enhancing knowledge economy development in Bosnia and Herzegovina have been made based on these results.

Keywords: knowledge economy, knowledge economy factors, higher education in knowledge economy.

1. INTRODUCTION

Even in the 16th century Sir Francis Bacon claimed „knowledge is power“ and suggested establishment of a new system whose final aim is production of new practical knowledge for „useage and benefit of human kind“. This thought can also be seen as the fundamental idea of modern day business in times of ongoing and fundamental changes and uncertainty. In these conditions corporations focus more and more on their own knowledge and development of new knowledge for improvement of business success and competitive advantages. Development of knowledge and knowledge management become imperative of the modern age. Knowledge has now become a factor of production and therefore investments in research, development and education are fundamentals of any succesful economic policy. Future of a national economy and economic growth of a country in a knowledge based society depends on the level of new knowledge. Effective and efficient application of knowlege as an additional factor of production is as necessary for achievement of economic development goals as traditional factors of production. Knowledge has become and will remain determining factor for individual and social welfare. The debate on knowledge economy has pointed towards the claim of a positive correlation between the country's level of knowledge and its economic growth. Considering this role of knowledge for achieving economic growth transition countries especially are able to benefit from it. Bosnia and Hercegovina(B&H) is in a transition period for a very long time and when analyzing current economic and political conditions it seems as if the policymakers still did not find the right way out of this transition period. B&H is a country with very poor economic performance, a huge foreign trade deficit, increasing unemployment but rich in natural resources. This research is based on the assumption that development of a knowledge economy could be the way out of the current state. But its development requires determination of the key factors which contribute to its development.

2. DEFINING THE KNOWLEDGE ECONOMY

The term „knowledge economy“ refers to the role of knowledge and technology for economic growth. Knowledge has always been important for economic development but in the past years the importance of knowledge and its relevance for economic growth has been growing. There is a certain number of factors which have contributed to such a development: technological progress, globalisation of the world economy, increased importance of specialised knowledge, increased awareness of the importance of knowledge for country's economic development and creation of new jobs. These trends indicate that knowledge economy describes a positive effect of knowledge on economic growth. There are numeorus terms that can be found in the literature which are used to describe this phenomenon. This is a result of lack of an universal definition of the term knowledge economy.

Asia Pacific Economic Cooperation (APEC) and Organisation for Economic Cooperation and Development (OECD) define that the knowledge economy is a term that is associated with new skills, high performance and new added value as the only way for enterprises and countries to compete in the global economy. According to OECD „the role of knowledge has gained on importance(compared to natural resources, physical capital and unqualified work force). And eventhough with different levels of progress all of the OECD countries are moving towards the economy based on knowledge.“ Another view on the knowledge economy defines it as application of knowledge based industries where the knowledge becomes the key competence. A wider view on the knowledge economy has been developing in the past few years. Sheehan and Grewal (2000), OECD, APEC and World bank have

presented a much more comprehensive definition of the term knowledge economy as an economy in which the use of knowledge is the key enabler of better productivity and growth in all industries. Economic success is based on effective use of non-material assets like knowledge, skills and potential for innovation as a key source of competitive advantage. This view on the knowledge economy opens new possibilities and gives hope to transition economies regardless of their size, availability of natural resources, level of industrialisation, level of economic development.

2.1. Theoretical views on the knowledge economy

It can be differentiated between four theoretical views on the knowledge economy. Firstly, economists who claim that knowledge as an input in quantitative and qualitative way is much more important today than it was before. Drucker (1998) claimed that knowledge is becoming one of the most important factors of production. OECD as well claimed that the role of knowledge (compared to resources, capital and work force) has gained on importance. The reason for this development according to OECD lies in the fact that the most OECD economies are moving towards economy based on knowledge. According to this view the accumulation of knowledge cannot be separated from the accumulation of capital which is considered to be the essence of the classical theory of production. Second theoretical view on the knowledge economy refers to the idea that in a certain way knowledge as a product is more important than before and that an increase of new activities based on trade of knowledge products is evident (Kanter, 1995). This claim can be confirmed with the fact that there is a significant increase of business services based on intensive knowledge. Thirdly, codified knowledge has become more important as a component of economically relevant knowledge. Abramowitz and David (1996) emphasised that main characteristic of recent economic growth is codified knowledge which is the basis for economic activities. And the last theoretical view is based on the presumption that the concept of knowledge economy is based on technological advantages. These changes and innovation in computer sciences and communications affect the business operations in general, have influence on the costs and influence the whole production cycle. For followers of Romer's new growth theory development and increased use of Information-communication technologies (ICT) as well as the growth of related sectors represent the basis for knowledge economy development. These technologies have enabled a new dimension for economic growth since they have made faster and cheaper codification and transfer of new knowledge possible.

Although some authors have different views on the knowledge economy the fact is that all of them highlight the relevance of new knowledge but observe it from different points of view. All of these theoretical views emphasise the importance of knowledge for economic growth and development since all economic activities are founded on some type of knowledge. Based on the presumptions of these concepts the progress in education, development of new technologies, research and development play a substantial role for economic growth. This is especially important for underdeveloped transition economies such as Bosnia and Herzegovina.

2.2. Drivers of the knowledge economy

Development of a knowledge economy involves changes across many aspects of the economy. There are numerous knowledge economy frameworks which provide a basis for knowledge economy development. But, not all of these frameworks are suitable for each country and its specifics. Based on experiences of many countries The World Bank Institute (WBI) introduced indicators that provide guidance in measuring of knowledge economy

development. The purpose of knowledge economy measurement is to describe the progress of a country in development of a knowledge economy. Based on empirical studies by the OECD and WBI a framework has been introduced to assist policymakers in knowledge economy development.

The conceptual framework designed and applied by WBI indicates that developing a knowledge economy requires the following key pillars: effective government institutions and economic incentives, education and training, ICT and infrastructure and developed system of research and development.

Effective government institutions and economic incentives

The influence of effective government on economic performance is evident in developed countries. Experiences in developed countries show a strong correlation between state governing and per capita income. Indicator of the quality of government indicates key obstacles to knowledge economy development. In transition countries this obstacle is mainly an inadequate legal environment. Generally, empirical research show that investors are primarily interested in the regulatory framework in a country and that they prefer to invest in countries with low-risk political regimes. Economic incentives in form of good tax laws, financial initiatives and flexible intellectual property regulative creates a more competitive business environment. This is important for creation and accumulation of new knowledge. Generally speaking, in a country with poor competition and with lack of preasure to create new products and services the level of creation of new knowledge is very low and therefore the level of economic growth as well.

Education and training

The second pillar of knowledge economy is an effective and productive educational system which can fulfill the needs of the economy. The importance of human capital is a result of need for better skills (e.g. team work or cognitive skills) and lifelong learning in order to be able to cope with business changes and challenges. The affect of knowledge and knowledge accumulation on the level of productibity indicates that an adequate education system is necessary to ensure knowledge transfer in the society. Educational system is a key factor of creation of innovative culture which is necessary for successful development of a modern economy. Educational system should ensure knowledge flow between individuals, companies and institutions through cooperation between educatonal institutions and companies which lowers the research and development costs in companies.

Information-communication tehnologies and infrastructure

Literature on the knowledge economy emphasises the importance of ICT on knowledge economy and country's economic development. But the full potential of ICT and ICT infrastructure cannot be utilized with undereducated workforce, traditional management practices and an inadequate legal framework. ICT do not generate knowledge but they allow individuals, companies and other organisations to access, use and transfer knowledge more efficiently, faster and cost efficiently. Development of ICT and their application has contributed to significant increase of demand for educated workers. Especially for transition countries development of ICT can be a significant factor for achieving economic development and growth.

Research and development (R & D) and innovation

Developed innovation culture depends on the government of a country which should create an environment which enables innovation in the private sector but also in the public sector. R&D activities request significant long term investments. In Bosnia and Herzegovina private companies mainly do not have sufficient financial resources to invest in R & D activities, and academic research activity is on a low level which affect the level of productivity and competetiveness.

2.3. Measuring the knowledge economy in Bosnia and Hercegovina

To asses readiness of a country for knowledge economy through use of indicators a country can be benchmarked. For this purpose WBI developed a methodology and a database covering data for countries computing them into indexes that reflect a country's performance regarding the knowledge economy pillars. The selection of twelve indicators gives an overall view of Bosnia and Hercegovina's knowledge economy readiness in comaprisson with Western and Central Europe.

A country is able to use this methodology in order to identify problems and opportunities however it does not reveal the solution to how to use this opportunities. Identification of strengths and weaknesses is possible by comparisson to countries in the region since it is important for these countries to coordinate their economic policies. Measurement of the level of readiness for knowledge economy development in Bosnia and Herzegovina is the first step in understanding the possibilities of this country.

Box 1. Indicators used for Knowledge Economy Benchmarking:

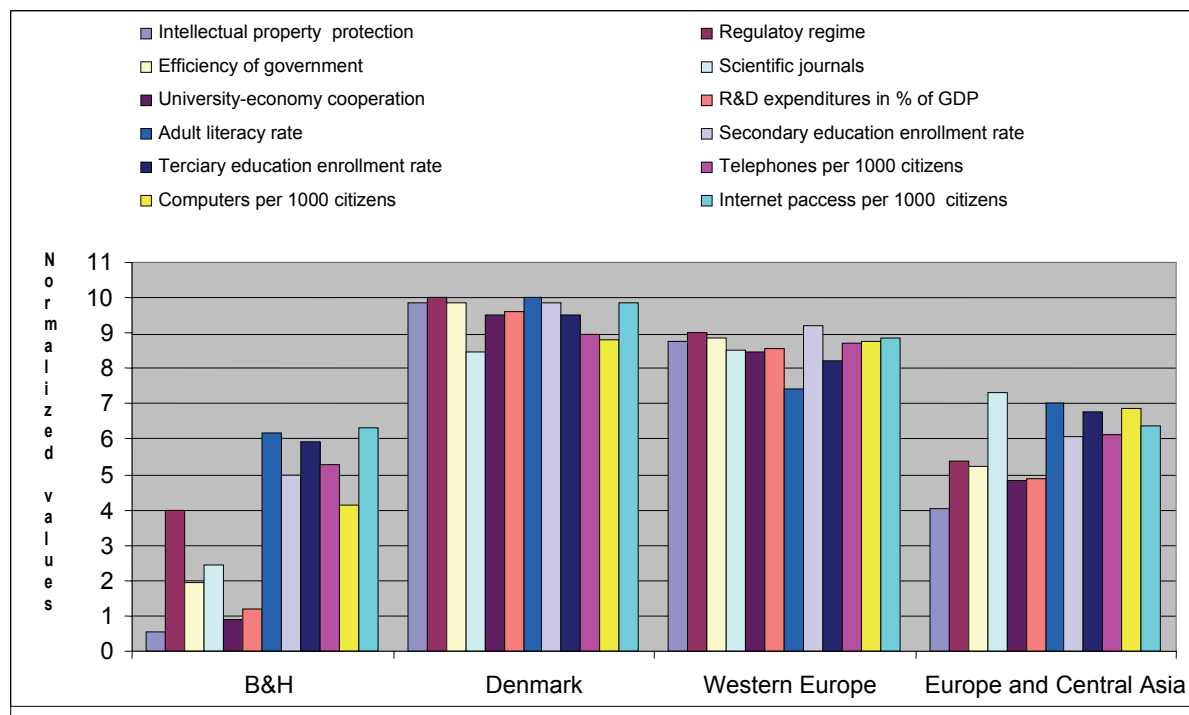
For each of the four knowledge economy pillars, these indicators have been selected:

- Government institutions and incentives pillar: Intellectual property protection, Regulatory regime, Efficiency of government
- Education pillar: literacy rate of adults, secondary and terciary enrolment rate.
- ICT infrastructure pillar: telephone numbers per 1000 persons, number of computers per 1000 persons, internet connections per 1000 persons
- R&D and innovation pillar: cooperation between universities and private sector, number of registered patents and total R&D expenditures in the private sector.

These particular three indicators for government institutions and economic incentives have been chosen to measure quality of government institutions and relevant policies and economic incentives that the government provides. The relevant education and training indicators for this research have been chosen as natural and essential building blocks which prepare individuals for knowledge attainment and development. Indicators which have been used to measure the development of ICT infrastructure have been chosen based on the research in developed countries for knowledge economy development in earlier stages and therefore are being considered equally relevant for measuring knowledge economy development in this research. The measurement of R & D was based on the use of the named indicators to determine the possibility of the academia to contribute to productivity increase through innovation. Generally speaking production of new knowledge is possible in an adequately

developed and well managed R & D system and therefore the level of R & D expenditures in the private sector can be useful indicator.

Picture 1: The 12 indicators of knowledge economy pillars



Source: World Bank Institute, 2009.

Values of the selected 12 indicators for knowledge economy pillars are presented in Picture 1. It is obvious that the levels of success of the pillars vary. Examination of these twelve indicators reveals varying degrees of achievement. The best normalised values Bosnia and Herzegovina has achieved in three of the twelve indicators (Adult literacy rate, Tertiary education enrolment rate, Internet access per 1000 citizens). The country's overall performance in these pillars is not competitive in comparison to other members of the benchmark group since Bosnia and Herzegovina scores lowest in the group. Bosnia and Herzegovina is strong in education with with normalised value 5,70 but the values of other pillars are much lower. These results lead to the conclusion that the readiness for developing a knowledge economy is on a very low level and a lot needs to be done in order to enable its creation and development.

In addition to the benchmarking process a quantitative approach (in form of questionnaire survey) was applied in the data gathering approach. The main advantage of this multi-method research strategy is to focus on the research problem from different points of view. The aim of this research was to answer the following key question *What are the potential key factors of a sustainable knowledge economy development in Bosnia and Herzegovina?* A questionnaire survey was conducted on a proportionately stratified sample of 150 middle and large enterprises. The questionnaire was divided into six parts each treating the four economy pillars (knowledge economy inputs, independent variables) and the knowledge economy outcomes/results (dependent variable). The analytical tools used were descriptive statistics and inferential statistics. The analysis technique used in this research was factor analysis. In this research factor analysis was used to group survey items into a meaningful order to identify key factors for knowledge economy development in Bosnia and Herzegovina. The factor

analysis is a useful tool for data reduction and provides a clearer picture of which factors act together according to their underlying dimensions. The criteria and procedures for selection and evaluation were in accordance with the standard criteria for social sciences research.

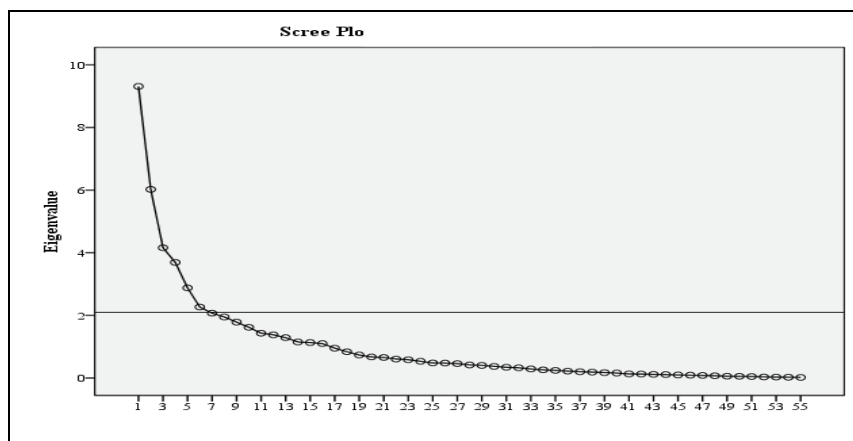
Bartlett's test of Sphericity and Kaiser-Meyer-Olkin Measure of Sampling Adequacy were used to evaluate the adequacy of the data for the factor analysis and the strength of the relation between the items. Based on these results it was concluded that the factor analysis is appropriate since the value of KMO is 0,602 and higher than 0,5. The Bartlett's test of Sphericity is also statistically significant because of its value $\chi^2=6298.931$, $p=0.0001$, $df=1485$. Based on this criteria it was concluded that it was justified to use the factor analysis for this research.

Table 1: Criteria and procedures for selection and evaluation of factors

<i>Components of factor analysis</i>	<i>Significant values</i>	<i>Justification</i>
Value of KMO	Higher than 0.5	Acceptable in social sciences
Type of rotation	Varimax	Most commonly used type of rotation
Factor weight	0.5 and higher	The higher the factor weight the more representative is the variable
Eigenvalue	Higher than 1.00	Usual criteria for factor determination
Number of items	3	Min. number of items necessary

According to the above five criterion selected for application of factor analysis (Table 1) 6 factors have been extracted according to their importance (Picture 2).

Picture 2: Scree Plot test of independent variables (knowledge economy inputs)



Based on the Scree Plot it can be concluded that the solution with 6 factors is appropriate. These factors according ranked by their importance are:

1. Higher education and development of educational system (12 items);
2. State regulative and environment (9items);
3. Use of ICT and ICT infrastructure (9 items);
4. Investment in research and development (4 items);
5. Training programmes for employees (5 items);
6. Importance of development and innovation acitivities (3 items).

All extracted items were loaded significantly on the six factors. The results of the factor analysis refer to the fact that education is very important for development of a knowledge economy in Bosnia and Hercegovina and that the respondents were extremely unsatisfied with the level of development of the educational system. Taking into consideration that the structure of work dramatically changes in the knowledge economy and that new and upgraded skills are required this is no surprise. In a knowledge economy the number of e. g. factory jobs of natural resources jobs decreases while the number of e. g. office jobs or jobs in health and educational sector increases. These changes will have the most affect on less skilled workers and factory jobs. Therefore the governments and educational institutions should emphasise the importance of longlife learning programmes. This result is also in accordance to the findings of Cohen and Soto (2001) who determined a positive effect of education on economic growth of a country by comparing time series of countries on average number of years of education. The second most significant factor is the government and its incentives which influence the economic activity and therefore the development of knowledge economy. The third factor ranked by its significance is the use of ICT and ICT infrastructure. As explained earlier use and development of ICT can contribute to improvement of productivity and better efficiency, but the results of the research point to the fact that the respondents mostly indifferent towards ICT or think that the present state regarding ICT is good. But the indicators for ICT show an opposite picture. This leads to the conclusion that there is a lot of space for improvement in ICT application and ICT infrastructure development. The fourth extracted factor is investment in R & D. The research results have shown that minor financial resources are invested in research and product development in the selected enterprises. The main reason for this is the economic and financial crisis which affected the economy in Bosnia and Hercegovina in the past couple of years. The fifth factor is programmes and training of employees. The results show that the selected enterprises insufficiently allocate financial funds into training programmes for employees which is an obstacle to adoption of new knowledge and its application. And the last factor is innovation and development activities. The ranking of this factor indicates a decreased importance of this factor for knowledge economy development for the respondents. This result is completely in accordance with their view on research and development activities which result in new ideas and innovated products, services or processes.

3. CONCLUSION

In this paper some of the results of a broader research have been presented. The researchers tried to approach the research problem from different points of view. The benchmarking in form of KAM enabled us to assess the current knowledge economy readiness in Bosnia and Herzegovina. The results of the quantitative research added two more drivers to the main four knowledge economy drivers, although they fall into the boundaries of the existing four pillars. Research by World Bank also accentuated that the emergence of knowledge economy has put a prime on education. Education is important because new ideas and innovation as a source of economic growth and development have important implications for application of knowledge. The factor analysis shows that higher education is of great importance for knowledge economy in Bosnia and Herzegovina. Other research in the USA also point to the fact that changing structure of work in the knowledge economy leads to increased demand for higher education. Policymakers should base the knowledge economy development strategy on the development of an appropriate educational system in this country. But, the development of an adequate educational system requires a serious reconsideration of its financing. This is the reason for a low innovative activity, knowledge transfer from academia to economy and a low level of creation of new knowledge which is necessary for a knowledge economy.

Policymakers should create policies for building an educational system which is able to provide quality education focused on skills and competencies needed in the economy and on programmes and activities aiming to build human capital. Bosnia and Herzegovina should create an environment for attracting foreign investments and build human capital, educational institutions and infrastructure for the knowledge economy. Only a quality educational system, focus on research and development, application of ICT and an adequate legal and institutional environment created by the government can contribute to knowledge economy development.

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